A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U8762

B.E. / B.Tech. DEGREE EXAMINATION, APRIL/MAY 2025

One Credit Course

Mechanical Engineering

21UME862 – SMART MATERIALS

(Regulations 2021)

Duration: 1.30 hours Maximum: 50 Marks

Answer ALL Questions

PART A - (14 x 1 = 14 Marks)

1. Fiber glass is the ---------reinforced by glass fibers CO1-U

   (a) plastic matrix (b) polymeric matrix (c) metal matrix (d) fiber matrix

2. Particulate composites have one or more material particles suspended in a ----- --- CO1-U

   (a)) metal matrix (b) polymer matrix (c) binding matrix (d) plastic matrix

3. Glass fiber tensile strength is ---- (GPa) CO1-U

   (a) 3.5 to 4.6 (b) 3.2 (c) 4.6 to 5.0 (d) 2.3

4. Single layer composites has ---------- reinforcement CO1-U

   (a) unidirectional (b) multi directional (c) randomized (d) non liner

5. ---------- compounds have combined properties of metal and nonmetals CO1-U

   (a) nonmetallic (b) bimetallic (c) Intermetallic (d) fiber

6. Intelligent materials which sense any environmental change and respond to it in an CO1-U

   (a) optical manner (b) electro manner (c) eco-friendly

   d) metal composites

7. Intelligent material for achieving a desired response adaptable to the CO1-U

   (a) work place (b) environment (c) automotive (d) aerospace

8. The Smart Control System will provide -------- for the sensors and actuators. CO1-U

   (a) quality (b) condition (c) feedback control (d) signals

9. These polymers consist of coil-like polymer chains: CO1-U

(a) Thermoplasts (b) Thermosets (c) Elastomers (d) All polymers

10. Thermochroic materials change reversibly colour with changes in ------- CO1-U

(a) pressure (b) temperature (c) volume (d) density

11. PTFE means CO1-U

(a) polytetra-fluid emulsion (b) poly tetra fluoro ethylene

(c) poly tetra fluorescence (d) poly tetra fluid ethanol

12 The end products of organic pigments CO1-U

(a) UV liquid (b) fluorescence (c) polyacryl (d) minerals

13. The smart materials is one that responds to a stimulus in its ---------- in a useful way. CO1-U

(a) industry (b) spaces (c) environment (d) earth

14. ---------- type charge sensor for highly sensitive detection of a DNA sequence CO1-U

(a) JFET (b) PTFE (c) LED (d) FET

PART – B (3 x 12= 36 Marks)

15. (a) What are smart materials and explain the commonly used smart materials. CO1-U (12)

Or

(b) Explain in details of shape memory effect. CO1-U (12)

16. (a) Explain the application of smart materials in various sensors. (gas, temperature, strain, stress) CO1-U (12)

Or

(b) What are smart materials? Explain its applications in various fields. CO1-U (12)

17. (a) Discuss about Electrical properties (piezoelectric effect) of smart materials. CO1-U (12)

Or

(b) Discuss about optical properties of smart materials. CO1-U (12)